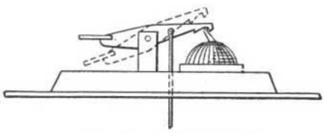
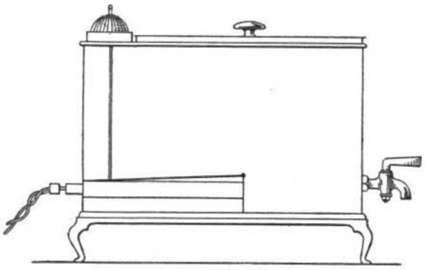
Great improvements have also been effected in the heating elements themselves. In the earlier apparatus it was customary to use coils of wire coated with or embedded in enamel, but trouble was experienced owing to the different coefficients of expansion of the wire and the enamel, and consequent cracking and gradual disintegration of the latter, due to unequal expansion. Enamel insulation has been considerably improved in this respect now, and some makers employ it with success, but the favourite method is to wind the high-resistance metal in the form of ribbon on mica strips, or to use flat strips of metal wound edgewise and separated by mica. One maker employs spirals of wire in quartz tubes, and another has for long been particularly successful with strips of mica upon which very thin films of metal have been deposited.

An interesting attachment to a water-boiler (made by the Bastian Electric Heating Syndicate) is shown diagrammatically in Fig. 5. Above the chamber containing the heater is a light, hinged metal flap, upon which bears the end of a rod connected to a catch lever holding the switch in the "on" position. The bubbling of the water when boiling causes the flap to rise, releasing the switch and thus turning off the current.



Details of Switch Release.



Sectional Elevation.

FIG. 5.—Water Heater with Automatic Switch.

MANKIND—FROM THE PLIOCENE TO THE PRESENT.[1]

DURING the last forty years the opening period of mankind has receded further and further into the past. At first we were content to count the years in thousands, then in tens of thousands, and now nothing less than hundreds of thousands is regarded as sufficient to cover the known period of man's existence on the earth.

The three works noticed here cover the whole of the human period so far as it is yet known. Dr. H. v. Buttel-Reepen deals with the Europeans of the Pleistocene or Glacial period, to which, following the teaching of Dr. A. Penck, he assigns a round half-million of years. Dr. Franz Schwerz takes up the story where Dr. H. v. Buttel-Reepen leaves off, and describes the various races which have inhabited his native canton of Schaffhausen since the Neolithic period began—one which he regards as commencing about 25,000 years ago. The third work, by Prof. Niederle, of the University (Tchéque) of Prague, is concerned with events which lie within the Christian period—the expansion and fate of the Slavonic race into south and central Europe and into Asia.

The three works are very different in nature; Dr. v. Buttel-Reepen's small monograph is a concise and excellent summary of the facts and theories relating to mankind in Europe during the Glacial period; it is the best of the many books that have lately appeared in Germany to supply a popular demand for information concerning early man, and is richly illustrated. Dr. Scherwz's monograph represents the results of personal research, and reflects the exact, elaborate, and painstaking methods of the Zurich school of anthropologists. Prof. Niederle's book is a stock-taking of the Slavonic race; he estimates that there were 139,000,000 Slavs at the commencement of the present century, more than 20,000,000 of whom occupy territories outside Russia, and are a continual cause of political unrest in central and eastern Europe.

It is the anthropological rather than the political data of Prof. Niederle's writings which interest us here. He appears to supply the answer to a problem which has puzzled Dr. Schwerz and has been an enigma to anthropologists in every country, especially in England. The problem concerns the source and supply of the brachycephalic races of central Europe and their sporadic appearance in Britain. The oldest human remains yet found in Schaffhausen—a canton almost surrounded by German territory—are those of Schweizersbild—remains which supplied Prof. Kollman, of Basle, with the basis for his famous theory of a pygmy prehistoric race in Europe. There can be absolutely no doubt that the Schweizersbild Neolithic men are identical with the Neolithic English described by Huxley as the "river-bed type"—people of rather low stature and with small heads, somewhat compressed from side to side and falling in the dolichocephalic group. The inhabitants of Schaffhausen soon after the beginning of the Christian era were also a long-headed people, which Dr. Schwerz associates with the Reihengräber of south Germany. The modern inhabitants of Schaffhausen are eminently short-headed, but as to how and when the short-headed people replaced the long-headed Dr. Schwerz can give no answer.

The change in head form in Schaffhausen is most probably due to a Slavonic permeation. In colouring and head-form the modern inhabitants of Schaffhausen are Slavonic. As far back as history and tradition can take us Russia has been the home of the greatest and most homogeneous mass of brachycephalic humanity. Prof. Niederle paints a picture of the exodus of the Bulgarians, Servians, Slovenes, Slovoques, Tschéques, Lusaciens, and Poles, from the parent stock in Russia, and their absorption in the German-speaking peoples.

We may be certain that what has taken place in historical times—a continuous exodus and absorption of the round-headed Slavonic stock—had been at work during the greater part of the Neolithic period, if not earlier. A round-headed race is not known to occur in western Europe until the latter part of the Paleolithic period. There is every reason to regard the short-headed races of mankind as comparatively recent products of evolution; every known example of Glacial and early post-Glacial man, with the possible exception of some Krapina people, is of the long-headed

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[1] "Aus dem Werdegang der Menschheit. Der Urmensch vor und während der Eiszeit in Europa." Von Dr. H. v. Buttel-Reepen. Pp. vi+139+109 figures in text+3 tables. (Jena: Gustav Fischer, 1911.)

"Versuch einer anthropologischen Monographie des Kantons Schaffhausen speziell des Klettgaues." Von Franz Schwerz. Neue Denkschriften der schweizerischen naturforschenden Gesellschaft, Bd. xlv., pp. 83–292+80 figures+1 map+87 tables. (Zürich: Zürcher & Furrer, 1910.)

"La Race Slave, Statistique, Démographie, Anthropologie." Par Prof. Lubos Niederle. Traduit du Tchéque par Louis Léger. Pp. xii+231+1 map. Paris: Félix Alcan, 1911.) Price 3.50 francs.

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type. From the present distribution of the short-headed races we may regard Russia as the most probable cradle of this race. The brachycephalic fair-haired European may be regarded as the latest and perhaps highest product in evolving humanity. Time will show that the brachycephalic peoples of Europe are essentially of Slavonic origin, and that brachycephaly will prove to be a Mendelian dominant in the fusion of long- and short-headed peoples.

Dr. v. Buttel-Reepen adopts Dr. Penck's three intermissions of the Glacial period—a first, second, and third; and in the tentative condition of our knowledge that division is as good as another. To the beginning of this period he assigns *Homo Heidelbergensis,* known from his mandible only and by the Eoliths ascribed to him. A minute study of this mandible leaves no doubt that *Homo Heidelbergensis* must be assigned to the Neanderthal race. Remains of this race are also ascribed to the second interval and the third succeeding Ice age—a period estimated at 200,000 to 400,000 years. If such a period is approximately correct, then it is wonderful that the type remained so constant throughout such a vast interval of time. We know of only nine crania of the race, and the limb bones of only five or six individuals, and in all of them the state of preservation is incomplete.

The rarity of such specimens probably explains the extraordinary sum paid by the Museum für Völkerkunde, in Berlin, for the skeleton discovered by Herr O. Hauser near Le Moustier in 1908—a price, according to Dr. Buttel-Reepen, amounting to 160,000 marks. The skull of this skeleton, like that found at Chapelle-aux-Saints, was so broken that in neither case has an approximately accurate reconstruction been made. Indeed, the only cranium which is nearly complete and intact is that found at Gibraltar so long ago as 1848—nine years before the discovery of the Neanderthal calvaria. This cranium, which Dr. Buttel-Reepen regards as of little scientific value, is, in the opinion of the writer, the most primitive and therefore probably the oldest of all the remains yet found of the remarkable Neanderthal race. It is the only one which shows a cranial capacity decidedly below the average of modern Europeans; the palate, and especially the teeth, are of the most primitive form known in this race. In such a long period of time as that ascribed to the Ice age, there must have been a succession of many races, and in the remains found at Krapina (Croatia), and at Spy (Belgium), we see what is apparently a mixture of older and more recent forms.

In the third interval of the Ice age the Neanderthal race apparently disappeared; his successor at present is supposed to be the type of man found at Gally Hill in Kent, and at Brünn in Moravia—a long- and narrow-headed race, so unlike the Neanderthal that Prof. Klaatch propounded the theory of a multiple simian origin for human races—a theory which Dr. v. Buttel-Reepen says must be taken *cum grano salis.* The remains found in the Grimaldi cave, near Mentone, and the Cro-Magnon race are also assigned to the close of the Glacial period. The Cro-Magnon race, which thus early appeared in Europe, is from a physical point of view, and also as regards the cranial capacity, one of the finest races of mankind ever evolved. The bearing of all recent discoveries of ancient man in Europe, both as regards his physical structure and his culture, is to remove the beginning of humanity into a more remote past—one which reaches into the Pliocene period at least.

Dr. Buttel-Reepen, like of many of his German colleagues, is inclined to assign the skull discovered in Gough's cavern, Cheddar, and described by Mr. H. N. Davies in 1904, to the Palæolithic period. There can be no doubt this is an error, for the cranium in question is an example of the "river-bed" type—the characteristic form in England during the early Neolithic period. The Tilbury skull, and one recently found in a Derbyshire cave by the Rev. E. H. Mullins, are also of this type.

A. Keith.

COAL DISCOVERIES IN BRITISH COLUMBIA.

THE announcement, made in a special article in *The Times* of October 14, on "Coal in British Columbia," that an "immense body of anthracite coal exists at the head-waters of the Skeena . . ." to quote the words used in the telegram from the Minister of Mines of that province, need cause no surprise when it is considered how little is yet known about the mineral resources of the vast territories comprised within the Dominion of Canada. If the figures given by Reuter may be taken as trustworthy, 2100 square miles and 43,000,000 tons per square mile, the estimated coal resources of the province leap up in a single bound from 40,225,000,000 tons, as estimated in 1910, to 130,525,000,000 tons, the addition amounting to about three times the quantity estimated to be contained in our own South Wales coalfield.

Very little information appears to have been allowed to leak out regarding this immense coalfield almost up to the moment when publicity was given to the foregoing statements. All that is said about it in the annual report of the Minister of Mines for the year ending December 31, 1910, is that "the anthracite district around the head-waters of the Skeena continues to attract attention" (p. K88). Again, on p. K176 of the same document a summary is given in the form of a table of the estimated coal-content of the various known coal areas in British Columbia, extracted from a paper read by Mr. D. W. Dowling, of the Geological Survey, before the Canadian Mining Institute at the Quebec meeting in March, 1911, in which the Skeena River is credited with sixteen square miles and 61,000,000 tons of anthracite. Lastly, when the present writer had the pleasure of meeting Mr. McEvoy (mentioned in the telegram of the Minister of Mines) in Toronto on March 7 last, nothing that he can recollect was said to give him any clue to the vastness of the coalfield which Mr. McEvoy was then about to re-visit.

In the table referred to above the names of twelve separate coalfields are given, probably all of Cretaceous age, containing 39,674 million tons of bituminous coal; three, probably of Tertiary age, containing 490 million tons of lignite; and one, the Skeena River coalfield, the geological age of which is not mentioned, containing sixty-one million tons of anthracite. The largest areas are those of Comox, 300 squares miles; Nanaimo, 350; Elk River, 230; Elk River north, 140; Graham Island, 60, all containing bituminous coal; and Graham Island, 100, lignite. Although the areas of Comox and Nanaimo fields are the greatest, the assumed thickness of coal in each, namely, six feet, puts their estimated reserves far behind those of the two Elk River fields, each with 100 feet of coal distributed in a number of separate seams. As stated in the article in *The Times,* the two first are in Vancouver Island. The seams of coal, Douglas and Wellington, with a rider from two to three feet thick under the first, and a similar rider from two to four feet thick above the second, crop out at a greater or less distance from the shore, not exceeding six or seven miles perhaps at most, and dip under the sea in the Strait of Georgia and under the small islands near the shore. The two last, Elk River and Elk River north, are cut through by the defiles in, and not far from, the watershed of the Rocky Mountains, and

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